Ferroelectricity Newsletter

A quarterly update on what's happening in the field of ferroelectricity

Volume 6, Number 3 Summer 1998

REPORTS FROM INDIA, FRANCE, AND GERMANY ILLUSTRATE THE SCOPE OF FERROELECTRIC RESEARCH

When you read these lines, a triad of international conferences will take place in Montreux on the Lake Geneva, Switzerland: the **11th International Symposium on Applications of Ferroelectrics (ISAF XI),** the **European Conference on Applications of Polar Dielectrics (ECAPD IV)**, and **Electroceramics VI**. It is the first time that these conferences, which have complimentary scopes, are held simultaneously at the same location.

In this issue we feature a triad of reports on what's happening in the field of ferroelectricity that gives us a taste of both the broad scope of activities and their wide geographical spread: the **Sixth Biennial International Conference on Ferroelectric Liquid Crystals (FLC '97)** in the Bretagne, France, the **Ninth National Seminar on Ferroelectrics and Dielectrics (NSFD-IX)** in New Delhi, India, and the papers contributed to the **Müser Festschrift** on **Dielectric, Elastic and Thermal Properties, Computer Simulations and NMR of Ferroelectrics and Related Materials**, dedicated to Professor Dr. Horst Müser in celebration of his 70th birthday.

Professor Müser encountered ferroelectricity when working in the early fifties on his doctoral thesis at the Institute of Applied Physics at the University of Münster, Westfalia, Germany. During the following decade he built up what came to be known as the most respected German group working on ferroelectricity.

At that time most of the research focused on careful investigation of Rochelle salt, the crystal which in the twenties was the first to be shown to become ferroelectric. Horst Müser's interest was directed toward the macroscopic linear and nonlinear dielectric, electromechanical, and piezoelectric properties of this crystal.

Under Professor Müser's guidance the influence of polar defects – some of which could be related to the balance of the crystal water – on the dynamical dielectric behavior and its coupling to the ferroelectric effect could be described and clarified in a detailed manner for the first time.

Maybe it is good for us – caught up as we are in the excitement of a triad of conferences – to pause for a moment and remember pioneers like Müser who not so long ago laid the foundation for today's accomplishments.

Rudolf Panholzer
Editor-in-Chief

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CONFERENCE REPORT

NINTH NATIONAL SEMINAR ON FERROELECTRICS AND DIELECTRICS (NSFD-IX)

As promised in the Winter 1998 issue, we are bringing you a report on the Ninth National Seminar on Ferroelectrics and Dielectrics held in India. We thank ***Dr. R.P. Tandon*** *from the National Physical Laboratory in New Delhi, who organized the seminar, for the following summary of the meeting and the list of papers given at the NSFD-IX.*

The seminar, held 8-12 October 1996 at the National Physical Laboratory (NPL) in New Delhi, was attended by about 150 scientists, including four delegates from the United States, Canada, and Japan. The National Seminar on Ferroelectrics and Dielectrics takes place every alternate year in different geographical locations of India. It was a rare occasion to hear Prof. L.E. Cross (Materials Research Laboratory, Penn State University, USA) and Prof. Michael Sayer (Queens University, Canada) talk on the global perspective of ferroelectric ceramics and ferroelectric thin films, respectively.

The meeting was opened by **Dr. A.E. Muthunayagam**, secretary of the Department of Ocean Development, who elaborated on how these important materials could be used for the exploration of the oceans.

In separate sessions, which included two poster sessions, the following topics were presented:

- Thin films
- Ferroelectric devices
- Physics of ferroelectrics
- Ferroelectric and dielectric properties
- Ferroelectric and related phenomena
- Processing of ceramics
- Other related topics.

All 17 invited speakers were eminent Indian and foreign scientists. **Prof. L.E. Cross** delivered the first keynote address on "Growth points for ferroelectric research in USA," covering a broad spectrum of newer materials with unique features. Some of these were smart actuator materials and thin films for DRAM applications. The most fascinating fact of his talk was that thicker (> 10 micron) thin films on silicon could open a whole new area of mini- and microelectromechanical systems. New possibilities exploring flextensional (Moonie and Cymbal) amplifier structures were also described.

Prof. M. Sayer of Queen's University, Kingston, Canada, gave the second keynote, entitled "Processing of ferroelectric films for device purposes." He discussed the application of these films for high density capacitors, ferroelectric memories, pyroelectric temperature sensors, and piezoelectric actuators, as well as the potential for new materials, such as nonlead and relaxor ferroelectric thick film piezoelectrics in optoelectronic systems.

Both keynote addresses were greatly appreciated and evoked lively response, as did the following 15 presentations by invited speakers. About 33 papers were selected to be given as oral presentations and 91 posters were exhibited in two poster sessions. Two students, Ms. Arunima Mukherjee of Allahabad University (best oral paper) and Mr. M.N. Satyanaryan of I.I.Sc. (Bangalore) received awards for the best oral and poster presentations.

A visit to Central Electronics Ltd., Sahibabad, organized with a view to promote the interaction between scientists and industry, was greatly appreciated by the participants.

Financial assistance and other support for the seminar was received from a number of private industries, as well as from the Council of Scientific and Industrial Research (CSIR), the Department of Science and Technology (DST), the

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Defence Research and Development Organization (DRDO), the Indian Institute of Technology (IIT), and Central Electronics Ltd. (CEL).

During the conference, the National Advisory Committee of the Seminar on Ferroelectrics and Dielectrics met to decide the venues of the next seminars: the Indian Institute of Technology (IIT) in Madras for 1998 and the Indian Institute of Science (I.I.Sc.) in Bangalore for 2000. It was suggested to couple an international meeting, such as the Asian Meeting on Ferroelectricity (AMF), with this event.

Growth points for ferroeclectric research in the USA
L. E. Cross

Processing of ferroelectric films for device purposes
M. Sayer

Integrated perovskite dielectric as alternate gate insulators in dynamic random access memory devices
S.B. Krupanidhi

Fabrication of optical grating assisted by surface acoustic wave
Y. Nakagawa

Piezoelectric sensor and actuator materials developed at NMRI for underwater applications
R. Lal

Recent developments in ferroelectric transducers
A. Bhanumathi

Correlations between microwave dielectric resonator materials and ferroelectric in (Ba, Sr) (Zr, Ti)O_3 systems
V.R.K. Murthy

A tensor classification of twinning in ferroic and nonferroic crystals
V.K. Wadhawan

Synthesis and characterization of nanocomposites
D. Chakravorty

Microwave dielectric research at Bharat Electronics, Bangalore
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Ferroelectric domains in potassium titanyl phosphate crystals
H.L. Bhat

Displacive ferroelectrics: An overview
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Periodic dielectric structure
S.C. Mathur and C.W. Lowe

Quantum ferroelectricity in $(Sr_{1-x}Ca_x)TiO_3$: Novel structural aspects
D. Pandey , and R. Ranjan

Microwave technique for the measurement of lifetime and dipole moment of the excited state
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Physical and chemical perfection of flux-grown rare earth perovskite crystals
P.N. Kotru

Recent trends in ferroelectric technology and integrated ferreolectric
H.V. Tiwary

Soft chemical (Chemie Douce) approaches/processing of $BaTiO_3$ powders: An overview
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Diffuse phase transition in complex $PbTiO_3$ ferroelectric ceramics
R.N.P. Choudhary

Mechanical properties of piezoelectric ceramics
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Space charge effect in ferroelectric ceramics
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Improvement of the electrical degradation behavior of sol-gel derived Ce-doped PZT thin films
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C-axis oriented ferroelectric thin film of silicon-doped $PbTiO_3$ on silicon by laser ablation
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Kinetics of formation of the pyrochlore phase in powdered sol-gel derived PZT
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Ferroelectric, dielectric, and optical properties of sol-gel prepared lead titanate thin films
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Solid state battery formation of ferroelectric silver vanadate doped with erbium oxide
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Nonlinear dynamics and protion motion in ferroelectric and polar compounds
V. Devarajan

Ferroelectric properties of lithium nionate: Some measurements and a structural model
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Lattice vibrational and microwave characteristics of dielectric resonator compositions in the solid solution system $Ca(Zr_x, Ti_{1-x})O_3$
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Infrared reflectivity analysis of new perovskite ceramics $Ba(Fe_{0.5}Nb_{0.5-x}MO_x)O_3$
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Dielectric characterization of flux-grown rare earth aluminate crystals
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Dielectric and hysteresis loop studies on potassium niobate single crystals
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Dielectric and pyroelectric properties of modified lead zirconate
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Structural and dielectric properties of sol-gel prepared PZT (La, Na) ferroelectric ceramics
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Preparation and characterization of iron-doped $BaTiO_3$ films
A.K. Tripathi, T.C. Goel, and P.K.C. Pillai

Influence of growth below and above Tc on the ferroelectric domain structure in flux-grown $KTiOPO_4$ single crystals
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Optical dispersion in sputtered zinc oxide thin films
V. Gupta, and A. Mansingh

A comparative study of BTO-derived $BaTiO_3$ powders using two different Ba precursors during synthesis
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Ferroelectric and microstructural studies in modified strontium titanium niobate
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Dielectric behavior of the $Ba_{1-x}La_xTi_{1-x}Cr_xO_3$ system
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Study of dielectric properties of strontium tartrate tetrahydrate crystals
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A study on chemical deposition of Sb-doped (Cd, Pb) thin films
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RF sputtered aluminum nitride thin film
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Sol-gel derived barium strontium titanium thin films
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Lattice thermal conductivity of $YBa_2Cu_3O_7$ superconductors
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Vibrational and dielectric studies of BIS (Thiourea) cadmium chloride $[(NH_2)_2CS]_2$ $CdCl_2$ and Tris (Thiourea) zinc sulphate $[(NH_2)Cs]_3ZnSO_4$ crystals
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Dielectric behavior of $Pb_{5-x}Sr_xGe_3O_{11}$[X=0.1,0.2,0.3]
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Dielectric and structural properties of vinyl chloride: Vinyl acetate copolymers
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Influence of niobium on dielectric parameters of barium nanotitanate ceramics
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Properties of porous PZT ceramics
R.P. Tandon and D.R. Chaubey

NEW JOURNAL FROM GORDON AND BREACH: FERROELECTRICS REVIEW

Under the editorship of George W. Taylor and Amar S. Bhalla, Gordon and Breach Science Publishers have launched a new journal, *Ferroelectrics Review*. The purpose of this new journal is to provide scientists and engineers with authoritative review articles on developments that parallel and complement their own specialties. A measure of the rapid growth in this field is that currently more than 4,000 articles are published per year on ferroelectricity and associated phenomena.

Initially one volume consisting of four issues of about 100 pages each will be published per year. The review articles will be on significant and active topics, well written and striking a good balance between being comprehensive and concise. The length of review articles is between 30 and 100 printed journal pages, depending on the particular topic.

The editors invite authors to submit articles on theory, measurements, and applications for possible publication. Authors are encouraged to first send the proposed title, an outline of their review article and/or a detailed table of contents to one of the editors or regional co-editors before writing their paper. Regional co-editors are Professors James Scott, Lev Shuvalov, Koichi Toyoda, Roger Whatmore, and Yao Xi.

The first issue features the article “The physics of ferroelectric ceramic thin films for memory applications” by James F. Scott from the University of New South Wales, Australia, and discusses ferroelectric thin films for integrated computer memories, emphasizing switching, leakage current, and breakdown mechanisms..

CONFERENCE REPORT

SIXTH INTERNATIONAL CONFERENCE ON FERROELECTRIC LIQUID CRYSTALS (FLC '97)

The Sixth Biennial International Conference on Ferroelectric Liquid Crystals was held at the Ecole nationale supérieure des télécommunications de Bretagne in France, 20-24 July 1997. **Jean-Louis de Bougrenet de la Tocnaye** and **Pierre Pellat-Finbet**, guest editors of the FLC' 97 proceedings, state in their preface that the papers are a representative collection of plenary lectures, oral and poster contributions on different aspects of the chemistry, physics, and applications of ferroelectricity in liquid crystal materials.

The conference was opened by a plenary lecture given by Professor T.C. Lubensky on chirality in liquid crystals from microscopic origins to macroscopic structure. The following plenary session delt with chemistry. Professor D.M. Walba presented observations on chiral polar smectic phases, Dr. H.T. Nguyen reported on the relationship between molecular structures and the existence of SC*A or TGB phases, and Dr. H. Bock discussed characteristics of switchable columnar phases. The third plenary session presented recent trends in physics. Professor N.A. Clark reported on chirality and ferroelectricity in liquid crystals; Professor H. Takezoe reviewed recent topics in FLC and and AFLC from a physics viewpoint. Dr. P. Cladis gave a lecture on the physical aspects of electrooptic properties of SC liquid crystals, and Professor S.A. Pikin discussed the thickness dependence of polarization and response characteristics in thin FLC films. The last plenary session was devoted to applications, with Dr. H. Mizutani talking on the Canon full color display; Dr. M. Wand on the Displaytech high resolution color FLC miniature display; and Dr. P.W. Surguy from Thorn EMI on applications in optical information processing.

In parallel sessions areas of display, optics, and telecommunication applications were discussed, while other sessions dealt with more fundamental aspects, such as phase transitions, surface interactions, and molecular materials. For the first time tutorials were offered at an FLC conference with Professor D.M. Walba lecturing on chemistry, Professor L. Blinov on physics, and Professor W.A. Crossland (assisted by Dr. T.D. Wilkinson) on applications.

Parallel to the more than 150 poster sessions a range of demonstrations were presented. One of the major events at the conference was the demonstration of the 15" diagonal digital full color FLC display from Canon, featuring the most recent technological advances in the flat panel display domain.

A plenary session on the future of ferroelectric liquid crystals, chaired by Professor S.T. Lagerwall, and followed by a panel discussion of experts drawn from both industry and academia, closed the conference. The outlook: By the end of the century we will see the emergence of many commercial ferroelectric and antiferroelectric liquid crystal flat panel displays and some niche markets for which FLC specificities are attractive.

The guest editors concluded: “The scope and strength of the contributions presented suggest that despite the technology's increasing maturity ferroelectric liquid crystals are still attractive and mysterious and continue to highlight the science of condensed matter, giving rise to even more research and applications.”

CEO OF TECHNOLOGY TRANSFER COMPANY HONORED

Ferroelectricity Newsletter contributor Dr. Louise C. Sengupta, former employee at the US Army Research Laboratory at the Aberdeen Proving Ground in Maryland and now CEO of Paratek, the first technology transfer company to locate in the northeastern Maryland region, was honored by Women in Science and Engineering (WISE) as the 1998 Women Engineer in the Federal Government. Under the trade name Parascan, Paratek will sell components for low-cost electronically scanning antennas which will dramatically improve the capabilities of cellular phones and high speed wireless communication.

It took company officials seven years working in the ARL at APG to develop the materials technology used in Parascan. The ARL holds the patent and Army officials support the transition of this technology into the private sector. The new company has also fostered alliances with the Naval Research Laboratory, the National Institute of Standards and Testing and several Defense Department aerospace contractors.

FLC'97 PAPERS

FLC '97 PAPERS

The following is a list of selected papers of the Proceedings of the Sixth Biennial International Conference on Ferroelectric Liquid Crystals (FLC '97), which was held at the ENST de Bretagne, Brest in France on 20-24 July 1997. The first two parts of the three-part proceedings are published in **Ferroelectrics,** *Volumes 212 and 213, Numbers 1-4, 1998, by Gordon and Breach Science Publishers. We will bring you the third and concluding part as soon as it is published.*

Physics

Chirality in liquid crystals: From microscopic origins to macroscopic structures
T.C. Lubensky, A.B. Harris, R.D. Kamien, and Gu Yan

Dynamic dielectric response of SmC* thin layer in planar geometry-thickness mode relaxation
I. Rychetsky, M. Glogarová, and A.M. Bubnov

Thickness dependence of polarization and response characteristics in thin FLC films
S. Pikin, M. Osipov, A. Biradar, L. Beresnev, and W. Haase

Direct measurements by the pulse pyroelectric technique of the soft-mode relaxation times on both sides of the smectic A-C* transition
L. Blinov, M. Ozaki, S. Okazaki, and K. Yoshino

Atomistic modeling of ferroelectric liquid crystals
D. Paschek, S. Y. Yakovenko, A. A Muravski, and A. Geiger

The dependence of polarization and dielectric biaxiality on the enantiomeric excess in chiral dopant added to a smectic C host mixture
M. Buivydas, S.T. Lagerwall, F. Gouda, R. Dübal, and A. Takeichi

The dielectric characterization of a material without layer shrinkage
M. Buivydas, S.T. Lagerwall, 1. Dierking, F. Gouda, and A. Mochizuki

Dielectric spectroscopy and electrooptic studies of new MHPOBC analogues
A. Fafara, B. Gestblom, S. Wrobel, R. Dabrowski W. Drzewiñski, D. Kilian, and W. Haase

Parameters of spontaneous polarization of a ferroelectric liquid crystals
T. Yata, H. Uehara, J. Hatano, S. Saito, H. Saito, E. Okabe, and Y. Galerne

Molecular dynamics of a chiral smectic liquid crystal as studied by ^{13}C NMR spectroscopy
H. Satoh, K. Hiraoka, and Y. Uematsu

Critical tilt angle for the optical properties of short pitch chiral smectic liquid crystals
P. Hubert, P. Jägemalm, C. Oldano, and M. Rajteri

Approximate elastic model of the stripe texture in free-standing chiral smectic C films
L. Lejcek, M. Glogarová, and E. Górecka

Macroscopic flow behavior of smectic C and smectic C* liquid crystals
T. Carlsson

Influence of siloxane groups on the properties of some sulfinate ferroelectric liquid crystals derivatives
P. Sebastião, S. Mery, M. Sieffert, J.F. Nicoud, Y. Galerne, and D. Guillon

Simultaneous studies of surface and bulk switching in ferroelectric liquid crystal devices
D.S. Pabla and S.J. Elston

Structures

Low voltage and high optical quality polymer dispersed FLC films
E.P. Pozhidaev, S.L. Smorgon, A.L. Andreev, I.N. Kompanets, V.Ya. Zyryanov, and S.I. Kompanets

Control of the antiferroelectric order in low molar mass organosiloxane liquid crystals
C. Carboni, W.K. Robinson, S.P. Perkins, and H.J. Coles

Structure and properties of liquid crystalline phases formed by achiral banana-shaped molecules
S. Diele, S. Grande, H. Kruth, Ch. Lischka, G. Pelzl, W. Weissflog, and I. Wirth

Influence of the fabrication shear rate on the electrooptic characteristics of PDFLC devices
M.J. Coles, C. Carboni, and H.J. Coles

Cell comprised of two adhering glass plates powered by parallel barriers; temperature gradient-cooled smectic liquid crystal orientation in restricted rectilinear space

FLC'97 PAPERS

K. Suzuki, A. Higuchi, and T. Minato

Dynamics of smectic layer alignment in ferroelectric and antiferroelectric liquid crystals
K. Nakayama, T. Togo. M. Ozaki, and K. Yoshino

Effect of UV-curing conditions on the ferroelectric behavior in FLC networks
J. Nourry, A. Vigouroux, A. Magnaldo, P. Sixou, M. Mitov, A. Boudet, M. Glogarová, and A.M. Bubnov

Investigation and control of domain formation in ferroelectric liquid crystal devices
D.C. Ulrich, M.J. Cherrill, and S.J. Elston

Phases and Phase Transition

Polarization sign inversion and smectic - asmectic-C surface transitions in freely suspended films of fluorinated and nonfluorinated compounds
D. Schlauf, Ch. Bahr, C.C. Huang, and J.W. Goodby

Under pressure studies of TGB_A and TGB_C phases of pure compounds
A. Anakkar, N. Isaert, J.-M. Buisine, and H.T. Nguyen

Observation of exotic subphases in an antiferroelectric liquid crystal
O.E. Kalinovskaya, Y.P. Panarin, J.K. Vij, A.J. Seed, M. Hird, and J.W. Goodby

Collective excitations in the vicinity of the SmA-SmC*α phase transition
A. Rastegar, M. Ochsenbein, I. Musevic, Th. Rasing, and G. Heppke

New Materials

Ferroelectric liquid crystals induced by atropisomeric dopants: Dependence of the polarization on the nature of the smectic host
D. Vizitiu, B.J. Halden, and R.P. Lemieux

Mesogenic behavior of optically active allenes: A new class of FLC
R. Lunkwitz. C. Tschierske , F. Gießelmann, and H. Fruth

Antiferroelectric liquid crystals and their chiral structures
Y. Aoki, and H. Nohira

Mesomorphic properties of 4'-(1methylheptyloxycarbonyl)phenyl 4'-(3-alkanoyloxyprop-1-oxy)- and 4'-(3-perfluoroalkanoyloxyprop-l - oxy) biphenyl-4-carboxylates
W. Drzewinski, R. Dabrowski, K. Czuprynski, J. Przedmojski, and M. Neubert

Novel ferroelectric mixtures for fast switching devices
N. Gough, M. Hird, C.J. Newsome, M. O'Neill, and A.K. Samra

Crystal structures of chiral mesogens with pyridine cores
K. Hori and C. Tsuji

Effects of the composition on the structure and ferroelectric properties of side chain liquid crystalline copolyacrylates
A.I. Alexandrov, F. Andruzzi, I.I. Konstantinov, P. Magagnini, M. Paci, T.V. Pashkova. E.L. Tassi, and S.V. Yablonsky

Novel optically active materials incorporating a 2,4-disubstituted oxazoline ring
A.G.M. Lamb, A.J. Eastwood. S.M. Kelly, and J.W. Goodby

Comparative study of helical pitch and electrooptical behaviors of highly twisted S_C* and S_C*α phases
V. Laux, P. Cluzeau, M.H.Li, N. Isaert, and H.T. Nguyen

Synthesis and properties of FLC with fluorinated asymmetric frames
Y. Nagashima, Y. Aoki, and H. Nohira

Synthesis and mesomorphic properties of (S)-lactic acid derivatives containing several ester linkages in the core
S. Pakhomov, M. Kaspar, V. Hamplová, A.M. Bubnov, H. Sverenyak, M. Glogarová, and I. Stibor

Achiral liquid crystals with an antiferroelectric-like phase
D.D. Parghi, S.M. Kelly, and J.W. Goodby

New ferroelectric liquid crystals with cyclic and noncyclic chiral groups
I. Mieczkowski, E. Górecka, D. Pociecha, and M. Glogarová

Influence of dopant structure on material properties in induced smectic C* phases
J. Rutkowska, P. Perkowski, Z. Raszewski, J. Kedzierski, R. Dabrowski, and W. Drzewinski

Synthesis of lateral chloro substituted biphenyl carboxylic acids and phenols for optically active esters
G. Sasnovski, V. Bezborodov, V. Lapanik, R. Dabrowski, and K.H. Uh

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Ferroelectric liquid crystals consisted of butyl lactate and 3-naphthyl-propenoic acid derivatives
T.Y. Wang, and L.J. Yu

Chiral mesophases of new menthyl containing copolymers
A. Bobrovsky, N. Boiko, and V. Shibaev

Optics

Optical guided mode studies of the director structure in FLC cells
J.R. Sambles, F. Yang, and D. J. Mikulin

Pyroelectric polymers for nonlinear optics
D.S. Hermann, A. Hult, L. Komitov, S.T. Lagerwall, and M. Lindgren

The influence of chiral strength on the spontaneous polarization and the second-order nonlinear optical susceptibility in ferroelectric liquid crystals
D.S. Hermann, A. Hult, L. Komitov, S.T. Lagerwall, F. Sahlén, and M. Trollsås

Second-harmonic generation in the QBS geometry of ferroelectric liquid crystals
D.S. Hermann, M. Lindgren, and S.T. Lagerwall

Ferroelectric twisted liquid crystal structure
M. Guena, M. Le Gall, and L. Dupont

Electrooptics

The flexoelectrooptic effect
P. Rudquist, L. Komitov, and S.T. Lagerwall

Physical aspects of electrooptic properties of smectic liquid crystals
P.E. Cladis and H.R. Brand

Electroclinic and induced biaxiality effects in new FLC mixtures
K. Saxena, L. Beresnev, L. Blinov, S. Pikin and W. Haase

Nonlinear electrooptical spectroscopy of ferroelectric liquid crystals
Y. Kimura, T. Nagata, and R. Hayakawa

Study of E-O properties of polymer network stabilized ferroelectric liquid crystal in smectic C* phase
J.J. Li, Z. Wang, Y. Cai, and X. Huang

The relaxation processes in helical antiferroelectric liquid crystals
Y.P. Panarin, O. Kalinovskaya, and J.K. Vij

Field induced phase transition in smectic $C_{ß}$* phase of antiferroelectric liquid crystals
H. Uehara, Y. Iino, J. Hatano, S. Saito, H. Saito, and E. Okabe

Electrooptical properties of thin PDFLC films prepared by TIPS and PIPS methods
V. Vorflusev and S. Kumar

Addressing and Switching

Multiplexing performance of a FLC with high spontaneous polarization in the bookshelf structure
Yu. P. Panarin, D.T. Little, and J.K. Vij

Gray level control by variation of the surface interaction in AFLCDs
B. Verweire, J. Fornier, and G. Cnossen

Comparative study of analog gray scale in various textures of SSFLC
V. Konovalov, A. Minko, A. Muravski, S. Yakovenko, S.R. Lee, and K.Y. Han

Effects of dielectric biaxiality and surface pretilt on τ-V characteristics of SSFLCs
N. Kageyama, F. Terawaki, M. Kimura, and T. Akahane

Domains and domain switching in antiferroelectric liquid crystal displays
J. Fornier and B. Verweire

Fast switching bistable polymer-dispersed ferroelectric liquid crystals
R. Karapinar, M. O'Neill, C.J. Newsome, N. Gough, and M. Hird

Displays

Digital full color ferroelectric liquid crystal display
H. Mizutani, A. Tsuboyama, Y. Hanyu, S. Okada, M. Terada, and K. Katagiri

High resolution color FLC miniature display and FLC materials optimized for their operation
M.D. Wand, R.T. Vohra, W.N. Thurmes, and K.M. More

New ferroelectric displays and operation modes
J. Fünfschilling, and M. Schadt

A high resolution full color, head mounted ferroelectric liquid crystal-over-silicon display
D.G. Vaas, W.J. Hossack, S. Nath, A. O'Hara, I.D. Rankin, M.W.G. Snook, I. Underwood,

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M.R. Worboys, M.S. Griffith, S. Radcliffe, D. Macintosh, J. Harkness, B. Mitchel, G. Rickard, J. Harris, and E. Judd

Non Displays

Ferroelectric liquid crystal on silicon spatial light modulator designed for high yield and low cost fabrication: The fast bitplane SLM
T.D. Wilkinson, W.A. Crossland, T. Coker, A.B. Davey, and T.C.B. Yu

Large-scale holographic switch with a ferroelectric liquid crystal spatial light modulator
H. Yamazaki, T. Matsunaga, S. Fukushima, and T. Kurokawa

A comparison of the efficiency and crosstalk of quaternary and binary phase-only holograms based on ferroelectric liquid crystals (FLC)
K.L. Tan, W.A. Crossland, and R.J. Mears

The binary phase-only 1/F joint transform correlator
T.D. Wilkinson, and V. Kapsalis

FLC-PVK OASLM for reconfigurable optical interconnects
Z.Y. Wu, J.-L. De Bougrenet da la Tocnaye, M.R. Perrot, P. Gravey, and R. Lever

Enhancement of SmA* liquid crystal electroclinic electrooptic effects using Fabry-Perot cavities at oblique incidence
W.K. Choi, A.B. Davey, W.A. Crossland, and T.D. Wilkinson

Enhancement of SmA* liquid crystal electroclinic electrooptic effects using resonated compound variable retarders
W.K. Choi, T.M. Coker, A.B. Davey, and W.A. Crossland

GORDON AND BREACH ESTABLISHES ONGOING SCIENTIFIC CONFERENCES ON THE WORLD WIDE WEB

In a move that dramatically increases the ability of researchers around the world to participate in scientific conferences, the Gordon and Breach Publishing Group announced its first-ever Virtual Conference on Ferroelectric Thin Films.

The conference is accessible through the company's Virtual Conference Center [http://www/virtual-conference.gbhap.com]. During a virtual conference, participants from around the world may post commentaries about the papers presented and submit Letters for review and eventual publication in the journal. Organized around presenters, commentators, and spectators, as well as sponsors and exhibitors, one can join the conference at any time of the day.

Each conference is controlled by a workshop organizer, usually the main editor of the subject journal, who grants access to the participants and oversees the papers presented, the commentaries, and review of submitted Letters. Anyone with a web browser can access the Virtual Conference Center web page to apply for the conference. Participants may converse with the authors about their papers, and authors may revise their articles and resubmit them to the conference organizer for refereeing and publication in the international journal *Integrated Ferroelectrics.* Participants may also expand their Comments into Letters. These, too, will be reviewed for publication in the final print version.

"We encourage all scientists and researchers interested in this field of study to participate in the conference, which is an ideal first step toward publishing their papers," said Dr. Deborah J. Taylor, the *Integrated Ferroelectrics* conference and sessions organizer. "It is an unparalleled opportunity to interact with fellow scientists no matter where in the world they may be."

Gordon and Breach has established other conference groups for *Ferroelectrics, Molecular Crystals and Liquid Crystals* and *Space Forum.* The first Virtual Conferences on Ferroelectric Thin Films will begin 8 January 1999, with registration and abstracts due by 1 November 1998.

MÜSER FESTSCHRIFT

Müser Festschrift
DIELECTRIC, ELASTIC AND THERMAL PROPERTIES, COMPUTER SIMULATIONS AND NMR OF FERROELECTRICS AND RELATED MATERIALS

This Festschrift, dedicated to Professor Dr. Horst Müser in celebration of his 70th birthday, is published in Gordon and Breach's international journal *Ferroelectrics* (Vol. 208, Numbers 1-4 and Vol. 209, Numbers 1-2, both 1998) and guest edited by Jörn Petersson, Julio Gonzalo, Jinzo Kobayashi, Vladislav Lemanov, and V. Hugo Schmidt.

In his guest editorial Jörn Petersson gives us the reason for this wide spread of nationalities the guest editors represent: "During the fifties and at the beginning of the sixties even in science the borders between nations, continents and, above all, between the western and eastern countries were high and strong. Horst Müser was engaged at all times to contribute personally to improve international exchange of scientists and scientific ideas. He tried to help to decrease the barrier heights or at least to initiate some tunneling process. Many colleagues from eastern countries were guest visitors of his group."

In his tribute to Horst Müser, V. Hugo Schmidt from the Montana State University in Bozeman talks about the variety of problems Professor Müser has tackled, among them "dielectric, specific heat, and ultrasonic measurements on a variety of crystals, ranging from Rochelle salt, barium titanate, and TGS through BP/BPI, BCCD, and betaine phosphate and arsenate. More recently, he has been engaged in Monte Carlo simulations of squaric acid and the study of chaotic behavior near ferroelectric phase transitions. This variety of contributions attests to his wide ranging curiosity and skill in analytical thinking."

Local and Cooperative Phenomena in Betaine Compounds

Betaine calcium chloride dihydrate (BCCD): Present status and recent experimental results
G. Schaak and M. Le Maire

Ultrasonic study of betaine compounds
E.V. Balashova, V.V. Lemanov, J. Albers, and A. Klöpperpieper

Optic soft mode in ferroelastic betaine squarate
H.-J. Zimmer, H. Thedens, and H.-G. Unruh

Ordering behavior at the antiferrodistortive phase transition in betaine phosphate and betaine phosphite
P. Freude, D. Michel, J. Totz, and A. Klöpperpieper

Indications of an intermediate phase in single crystals of betaine phosphate/phosphite solid solutions
R. Böttcher, A. Pöppl, G. Völkel, J. Banys, and A. Klöpperpieper

Structure and dynamics of radicals created by gamma-irradiation in betaine phosphate single crystals: An ENDOR study
H. Metz and R. Böttcher

General Aspects of Modulated Structures

Models for the description of uniaxially modulated materials
B. Neubert, M. Pleimling, and R. Siems

Simulations of dynamics of aperiodic crystals
T. Janssen

NMR-evidence for absence of floating in structurally incommensurate crystals
F. Decker, U. Häcker, K.-P. Holzer, P. Mischo, J. Petersson, and D. Michel

General Properties of Ferroelectric Crystals

Electrooptic and photorefractive properties of ferroelectric barium calcium titanate crystals
Ch. Kuper, K. Buse, U. van Stevendaal, M. Weber, T. Leidlo, H. Hesse, and E. Krätzig

Quadrupole splitting on the ^{7}Li NMR line in $LiNbO_3$ crystals
E.V. Charnaya, V.S. Kasperovich, and M.G. Shelyapina

A Lorentz field theory for ferroelectric transitions in layered perovskites
X. Du and I-Wei Chen

Small signal amplification caused by nonlinear dielectric properties of TGS

MÜSER FESTSCHRIFT

R.-P. Kapsch, M. Diestelhorst, and H. Beige

Temperature dependence of the order parameter at the quasi-tricritical phase transition in ferroelectric TGSe
T. Iglesias, J.R. Fernandez del Castillo. N. Cereceda, G. Lifante, J. Przeslawski, and J.A. Gonzalo

Measurement of thermal properties of thin dielectric films and anisotropic solids by AC hot-strip method
S.T. Davitadze, S.N. Kravchun, N.S. Mizina, B.A. Strukov, B.M. Goltsman, V.V. Lemanov, and S.G. Shulman

Glasses and Relaxor Ferroelectrics

Computer simulations of a Lennard-Jones model for $Ar_{1-x}(N_2)_x$: A prototype system for quadrupolar glasses
M.H. Müser, D. Löding, P. Nielaba, and K. Binder

Possible dynamic phase transition of the quadrupolar glass $(KCl)_{1-x}(KCN)_x$
Chr. Kaiser and K. Knorr

Shear elasticity and the orientational glass state of $(NaCl)_{1-x}(NaCN)_x$ mixed crystals
Chr. Kaiser, J. Albers, K. Knorr, and J. Petersson

Surface induced organization of polyvinylidenefluoride-trifluoroethylene on nanostructures polytetrafluoroethylene: The ferroelectric phase transition
C. Fischer, J.K. Krüger, B. Heydt, B. Servet, and P. Galtier

Polarization changes in the ferroelectric relaxor lead magnesium niobate
N.N. Krainik, L.S. Kamzina, and S.A. Flerova

The inverse electromechanical effect in mechanically oriented S_c-elastomers examined by means of an ultrastable Michelson interferometer
W. Lehmann, P. Gattinger, M. Keck, F. Kremer, P. Stein, T. Eckert, and H. Finkelmann

Domains, Ceramics, and Microstructured Materials

Domain reorientations and piezoeffect in PZT ceramics
A.G. Luchaninov, A.V. Shil'nikov, and L.A. Shuvalov

Sound waves in polydomain ferroelectrics
O.Yu. Serdobolskaya and G.P. Morozova

Far-infrared spectroscopy of a $SrTiO_3$ thin film
I. Fedorov, V. Zelezny, J. Petzelt, V. Trepakov, M. Jelinek, V. Trtik, M. Cernansky, and V. Studnicka

Dielectric response of microcomposite ferroelectrics
O. Hudak, I. Rychetsky, and J. Petzelt

Changes in the piezoelectric parameters of PZT ceramics during the poling process
A.M. Gonzalez. J. de Frutos, C. Duro, C. Alemany, and L. Pardo

Optical study on the phase transition of $Pb_{0.92}La_{0.08}(Zr_{0.65}Ti_{0.35})_{0.98}O_3$
T. Asahi, Y. Itagaki, H. Utsumi, H. Yoshii, I. Kamiya, M. Ichiki, M. Takahashi, and J. Kobayashi

UPCOMING MEETINGS

International Conference on Solid State Crystals Materials Science and Applications
12-16 October 1998
Zakopane, Poland

Topics

- Crystal growth
- Nanostructural materials and films
- Characterization and application of solid state materials
- New trends in IR detectors
- Organic materials for electronics

Contact

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11th International Symposium on Integrated Ferroelectrics (ISIF '99)
7-10 March 1999
Colorado Springs, Colorado, USA

The 11th annual International Symposium on Integrated Ferroelectrics will be held 7-10 March 1999 at the Antlers Doubletree Hotel in Colorado Springs. Substantial progress has been made in the science and technological applications of ferroelectric thin films, which promises a bright future for potential new technologies. We think that ISIF '99 provides an appropriate forum for a critical review of the science and technology of the two main ferroelectric materials being investigated for application to NVFRAMs.

The work on high permittivity thin films suggests that these materials may play a fundamental role in a new generation of DRAMs. The field of ferroelectric/piezoelectric materials is experiencing explosive growth due to the potential applications in MEMS technologies. Another important field that is attracting the attention of funding from various agencies is pyroelectric sensors.

Topics

- Ferroelectric memories
- Ferroelectric and pyroelectric CCDs
- High dielectric constant materials for ULSI DRAMs
- Integrated optics
- Optical storage
- Radiation-related subjects, such as radiation hardness
- Fundamental properties
- Process and substrates
- Process integration
- New devices and architecture
- Device modeling
- Materials processing and integration
- Supporting circuitry and applications
- Ferroelectric ASICs
- Smart tags and RF ID devices
- Neural networks
- Microsensors and actuators
- Bypass capacitors
- GaAs/ferroelectric devices
- Reliability
- Applications and new products
- Biomedical
- Functionally graded ferroelectrics

UPCOMING MEETINGS

Tutorial Sessions

Four tutorial consecutively running tutorial sessions are planned for Sunday, 7 March 1999, from 1:00 to 6:00 pm. The topics for the tutorial sessions will be announced at a later date. Tuition is $200 per person for the four sessions.

Poster Session

ISIF '99 will again feature a poster session. Please indicate with your abstract if you prefer the poster session.

Organization/Company Exhibits

If your organization or company wishes to have an exhibit or display during the symposium, please send your proposal to Kerry Baugh at the ISIF office in Colorado Springs (see address below).

Associated Meetings

The ISIF Advisory Board (Orlando Auciello, Chairman) will hold a general meeting with all attendees invited.

Organization

C.A. Paz de Araujo and R. Panholzer, chairmen
R. Ramesh, technical program chairman and tutorial chairman

Abstracts Deadline

31 October 1998

Contact

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Transducers '99: 10th International Conference on Solid State Sensors and Actuators
7-10 June 1999
Sendai, Japan

The 10th International Conference on Solid State Sensors and Actuators (Transducers '99) will be held in Sendai, Japan, from 7 to 10 June 1999, sponsored by the Institute of Electrical Engineers of Japan. Transducers is a biennial conference focusing on theory, design, fabrication, and application of solid state sensors, actuators, and microsystems. It is an interdisciplinary gathering with participants from university, government, and industrial laboratories representing a large spectrum of fields: electrical and mechanical engineering, materials science, biomedical engineering, physics, biology, chemistry, and microelectronics. This largest conference in the field today will be an exciting place for discussing the latest technical developments.

Topics

- General and theoretical: Innovative concepts, new effects, principles of devices and system design, scaling, modeling, CAD tools and methods
- Materials and fabrication technology: Advanced materials for sensing or actuation, micromachining, bonding, 3D fabrication, microassembly, packaging, reliability and testing, degradation mechanisms, failure analysis
- Mechanical sensors: Sensors for force, pressure, acceleration, angular movement, flow position, sound and

UPCOMING MEETINGS

related device physics, systems and applications
- Physical sensors (nonmechanical): Electric, magnetic, optical, radiation, thermal, and optoelectronic sensors, and related device physics, systems, and applications
- Chemical sensors: Sensors for ions and molecules, humidity sensors, gas and vapor sensors, sensing principles (mechanical, acoustical, fluidic, electrical, optical, etc.) sensor physics and chemistry, multisensor arrays, systems, and applications
- Biosensors and microsystems: Sensors in biology and medicine, sensing principles (mechanical, acoustical, fluidic, electrical, optical, etc.) enzymatic, immunological, genetic analysis, sonsor physics and chemistry, systems, applications, micro total analysis systems (μ-TAS), molecular manipulation
- Actuators: Electrostatic, magnetic, piezoelectric, fluidic, thermal, shape-memory alloy and other actuators, recording and print heads, microvalves, micropumps, micromotors, microrobots, actuator arrays, related device physics, systems, and applications
- Interfaces and system issues: Signal processing and transmission, system architecture, neural networks in sensor systems, calibration, compensation, and standards

Important Dates

Deadline for abstracts: 30 November 1998
Notification of acceptance: 20 February 1999
Deadline for camera-ready manuscript: 31 March 1999

Contact

Transducers '99, Attn.: J. Echizen; phone +81-3-3299-1371; fax +81-3-3299-1361; e-mail tr99@twics.com
www.com.cas.uec.ac.jp/trans99.html

9th European Meeting on Ferroelectricity (EMF-9)
12-16 July 1999
Prague, Czech Republic

Since 1969 the European Meetings on Ferroelectricity, complementing the series of International Meetings on Ferroelectricity, have taken place every four years. EMF-9 covers a broad spectrum of topics, from structural phase transitions and their structural and lattice-dynamical aspects to dielectric, acoustic, electromechanic, optic, nonlinear optic, and electrooptic phenomena, as well as their applications in crystals, liquid crystals, ceramics, polymers, glasses, and thin films.

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UPCOMING MEETINGS

Contact
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Icaris, Ltd., Conference Management, EMF-9, Nam Dr. Holeho 8, 180 00 Praha 8, Czech Republic; phone +420-2-683-6100; 684-7059; 684-4304; fax/phone +420-2-684-0817; e-mail icaris@bohem-net,cz

Eleventh American Conference on Crystal Growth and Epitaxy
1-6 August 1999
Tucson, Arizona, USA

Organized by the American Association for Crystal Growth, this meeting will emcompass both thin film and bulk growth and will span the range of fundamentals of solidification, modeling of crystal growth, experimental studies, characterization and the latest applications. The full range of materials will be addressed, including semiconductors, nitrides, carbides, oxides, halides, organics, and metals.

Topics
- Nonlinear optical and photorefractive materials
- Epitaxial growth and materials
- Laser materials
- Wide band-gap materials
- Crystal growth in microgravity
- Special session celebrating 50 years of dislocation theory
- Protein crystal growth

There will be invited speakers on selected topics. Award(s) will be presented for the best student paper(s).

Abstract Deadline
28 February 1999

Organization
Conference chairs: Vincent Fratello (Lucent Technologies Bell Labs) and Debra Kaiser (NIST)
Program chairs: Patricia Morris Hotsenpiller (Dupont Central R&D) and Robert Biefeld (Sandia Laboratories)

Contact
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www.aml.arizona.edu/aacg

Short Course on Crystal Growth
31 July - 1 August 1999
Tucson, Arizona, USA

This course immediately preceding the conference at the same site will enable students, newcomers, those changing fields, and all others interested to hear focused reviews on selected topics at the forefront of crystal growth.

Contact
same as above

CALENDAR OF EVENTS

Sep 20-23	•	3rd International Meeting of Pacific Rim Ceramic Societies (PacRim 3), Kyongju, Korea (see *Ferroelectricity Newsletter,* Vol. 5, No. 4, p. 17)
Oct 5-7	•	4th International Conference on Intelligent Materials (ICIM'98), Chiba, Japan (see *Ferroelectricity Newsletter,* Vol. 5, No. 4, p. 16)
Oct 12-16	•	International Conference on Solid State Crystals Materials Science and Applications, Zakopane, Poland (see p. 16)
Oct 25-28	•	IEEE Conference on Electrical Insulation and Dielectric Phenomena (CEIDP98), Atlanta, Georgia, USA (see *Ferroelectricity Newsletter,* Vol. 6, No. 2, p. 12)
Nov 2-6	•	45th International Symposium of the American Vacuum Society, Session EM12: Processing of High Dielectric Constant Materials for DRAMs, Baltimore, Maryland, USA (see *Ferroelectricity Newsletter,* Vol. 6, No. 2, p. 12)
Dec 1-3	•	Micro System Technologies 98, Potsdam, Germany (see *Ferroelectricity Newsletter,* Vol. 6, No. 2, p. 13)
Dec 8-11	•	2nd Asian Meeting on Ferroelectrics, International (AMF-2), Singapore (see *Ferroelectricity Newsletter,* Vol. 5, No. 4, p. 18)

1999

Mar 7-10	•	11th International Symposium on Integrated Ferroelectrics (ISIF '99), Colorado Springs, Colorado, USA (see p. 16)
Jun 7-10	•	Transducers '99: The 10th International Conference on Solid-State Sensors and Actuators, Sendai, Japan (see p.17)
Jul 12-16	•	9th European Meeting on Ferroelectrcity (EMF-9), Prague, Czech Republic (see p. 18)
Jul 31-Aug 1	•	Short Course on Crystal Growth, Tucson, Arisona, USA (see p. 19)
Aug 1-6	•	11th American Conference on Crystal Growth and Epitaxy, Tucson, Arizona, USA (see p. 19)
Aug 4-13	•	18th International Union of Crystallography and General Assembly, Glasgow, Scotland Gill Houston, crystal@glasconf.demon.co.uk *or* Chris Gilmore iucr99@chem.gla.ac.uk

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